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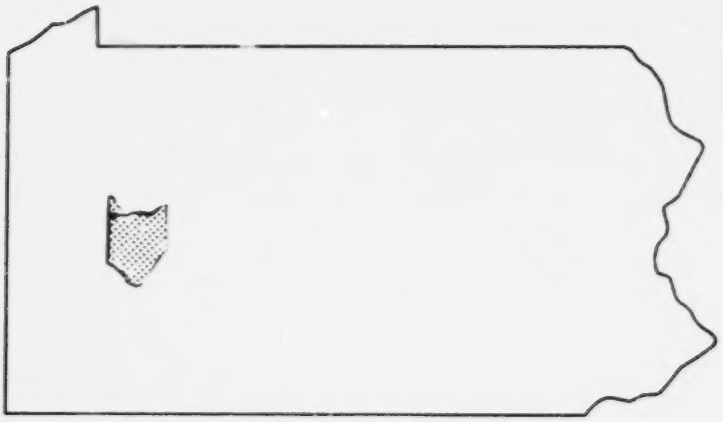
FLOOD INSURANCE STUDY

TOWNSHIP OF PERRY, PENNSYLVANIA
ARMSTRONG COUNTY



MAY 4, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 422301

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
TOWNSHIP OF PERRY, ARMSTRONG COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Perry, Armstrong County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared using a Flood Plain Information report on the Allegheny River prepared by the Pittsburgh District of the U. S. Army Corps of Engineers (COE). The work for that report was completed in December 1973.

1.3 Coordination

On October 27, 1986, the Township of Perry was notified by the Federal Emergency Management Agency (FEMA) of the initiation of a Flood Insurance Study for the community.

On April 27, 1987, a final Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA and the township to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Perry, Armstrong County, Pennsylvania. The area of study is shown on the Vicinity Map (Figure 1).

The Allegheny River was studied by detailed methods for its entire length within the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Bear Creek was studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

2.2 Community Description

The Township of Perry is located in the northern portion of Armstrong County along the western bank of the Allegheny River. It is bordered by the City of Parker City to the north; the Townships of Fairview and Parker to the west; the Township of Brady's Bend to the south; and the Townships of Perry (Clarion County) and Madison, and the Allegheny River to the east.

The Allegheny River basin has a drainage area of 11,778 square miles. This basin lies between the headwaters in the western slope of the Appalachian Mountain Range in the northwestern part of Pennsylvania and its confluence with the Monongahela and Ohio Rivers in the City of Pittsburgh. The Allegheny River flows for a total distance of 322 miles, flowing generally northwest to Salamanca, New York; southwest to Franklin, Pennsylvania; southeast to the mouth of Mahoning Creek; and southwest to Pittsburgh, Pennsylvania (Reference 1).

The climate for the area is temperate with normal seasonal variations in temperature. Armstrong County is geographically located in a region of both polar and tropical air mass activity, subjected to continental and maritime invasion. The weather is usually moderate but may have occasional rapid changes resulting from frontal air mass movements. Temperatures seldom exceed 90 degrees Fahrenheit (^{o}F) in midsummer or dip below zero in the winter months. Measurable precipitation occurs on an average of 149 days a year and amount to an annual average of 42 inches. The average snowfall is 40 inches per year, and a snow cover of 1 inch or more can be found during at least 80 days per year. Of this measurable precipitation, approximately 58 percent is lost through evaporation, transpiration, and infiltration; less than 2 inches or 10 percent of the available water is used; and the remaining water moves into streams as runoff (Reference 1).

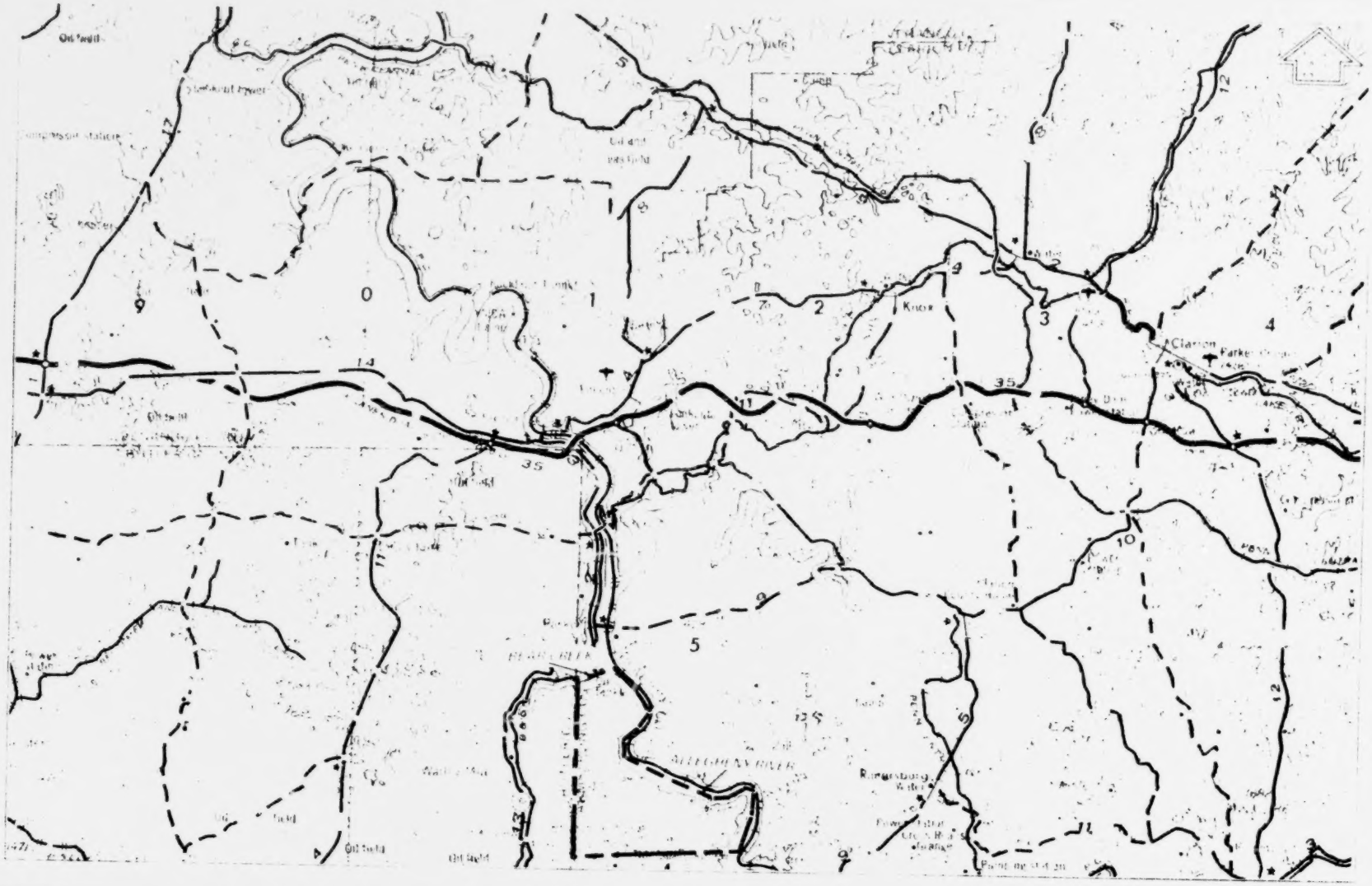


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PERRY, PA

(ARMSTRONG CO.)

APPROXIMATE SCALE

1 0 1 8 1/2 MILES

VICINITY MAP

2.3 Principa Flood Problems

Major floods have occurred on portions of the Allegheny River at various times of the year; however, the main flood season is usually December through April. Most of the floods during this period are the result of heavy rain and snowmelt. It is possible for large floods with a duration of several days to occur at any time of the year. Although summer floods are rare on the Allegheny River, the flood of June 1972 was of considerable magnitude in spite of the reduction by control dams and reservoirs located upstream of the Township of Perry's corporate limits.

Natural obstructions to flood flows include trees, brush, and other vegetation growing along the stream banks in floodplain areas. Man-made encroachments on or over the Allegheny River such as dams, bridges, and culverts can also create more extensive flooding than would otherwise occur. Within the Township of Perry, there are no bridges crossing the Allegheny River.

Ice gorge development, historically a problem along portions of the Allegheny River, has caused major flood crest elevations from relatively minor flood flows. In addition, large flood flows have coincided with ice gorges, causing even higher flood crest elevations. A major flood in the Township of Perry occurs when the river stage exceeds 20 feet. The maximum recorded flood level in the township occurred in January 1959, resulting from heavy rain and snowmelt coincident with ice jamming. The maximum flood flow during the period of record occurred in March 1913, which was 1.2 times larger than that of January 1959. The March 1913 flood crested 2.4 feet below the January 1959 level. The historical flood of March 1865 is known to have exceeded the March 1913 flood level, having an estimated flood flow approximately 1.4 times that of January 1959. The March 1865 flood crested an estimated 0.2 foot below the January 1959 flood crest.

U. S. Geological Survey (USGS) gaging station No. 03031500 is located on the Allegheny River approximately 500 feet downstream of the State Route 368 bridge over the Allegheny River in the City of Parker City.

2.4 Flood Protection Measures

There are five dams on the Allegheny River in Armstrong County, none of which are within the Township of Perry's corporate limits. These dams are not gated and have no flood control capacity. They are fixed-crest structures designed to maintain normal pool elevations during low water. Nine upstream flood control dams and reservoirs, built, operated, and maintained by the COE, act to reduce flood levels on the Allegheny River within Armstrong County. Flows impounded by this system of reservoirs reduce major flood crests by 4 to 10 feet. During the flood of June 1972, these reservoirs reduced the flood crest by 5.1 feet. This prevented a flood crest 4.6 feet higher than the March 1913 flood.

A forecasting service for the entire Pittsburgh District is provided by the National Weather Service of the National Oceanic and Atmospheric Administration (NOAA). Approximately 50 daily reports of river levels and precipitation amounts from a network of observers established by the National Weather Service and the COE are used in preparing general river forecasts. In 1955, the Commonwealth of Pennsylvania established an efficient Civil Defense Organization on a statewide basis for the dissemination of flood warnings. The Armstrong County Civil Defense Organization has an established Standard Operational Procedure (SOP) that describes specifically the measures and actions to be instigated during flood emergencies. The Office of Civil Defense directs and coordinates all flood disaster operations from the Civil Defense Emergency Operating Center. Assisting organizations, such as the Red Cross, State Troopers, Salvation Army, and National Guard are alerted and utilized as necessary. Close liaison is maintained by the Director of Civil Defense with the COE and weather forecasting personnel before, during, and following all flood emergencies.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

The hydrologic analysis for the Allegheny River was taken from the Flood Plain Information report prepared by the COE (Reference 1). In that report, flood flows for the Allegheny River were developed

following the standard log-Pearson Type III analysis of stage-discharge records using methods outlined by Water Resources Council Bulletin 15 (Reference 2). The stage-discharge records used in the analysis of the Allegheny River were obtained at Lock and Dam No. 7 at Kittanning with 55 years of record. A staff gage located on the upper lock wall at Lock and Dam No. 7 has been maintained by the COE since January 1931. In 1939, the USGS installed a recording gage on the upstream lock wall. Prior to 1931, a nonrecording gage was maintained downstream of Lock and Dam No. 7. Records were also used from USGS gage No. 03031500 (with 54 years of record), located on the right bank of the Allegheny River approximately 500 feet downstream from the State Route 368 bridge. Newspaper files, historical documents, and records were searched to supplement the gaging station records. Additional high-water mark data, obtained by field observations and interviews with local residents, were referenced to bench mark elevations above mean sea level.

A summary of the drainage area-peak discharge relationships for the Allegheny River is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ALLEGHENY RIVER					
At USGS gage No. 03031500 at Parker City*	7,671	**	**	173,000	209,000

*Located outside corporate limits
**Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The hydraulic analysis for the Allegheny River was taken from the COE study: Flood Plain Information, Allegheny River, Armstrong County, Pennsylvania (Reference 1).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and the Flood Insurance Rate Map (Exhibit 2) where applicable.

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 3). Flood profiles were drawn showing computed

water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for the Allegheny River were based on stage-discharge relationships at the downstream corporate limits that were obtained by a continuation of profile computations starting at the Allegheny River in Pittsburgh, Pennsylvania.

Roughness coefficients (Manning's "n") for the Allegheny River were chosen on the basis of field inspection and verification of roughness requirements to reproduce profiles for known floods for which high-water marks were obtained and flow quantities were measured or easily calculated. For the Allegheny River, the channel "n" value was 0.028, and the overbank "n" values ranged from 0.050 to 0.080. The well-defined flood of June 1972 and moderate flow of October 1954 were reproduced successfully using these channel and overbank "n" values.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 4).

For the stream studied by approximate methods, the boundary of the 100-year flood has been delineated using the Flood Hazard Boundary Map for the Township of Perry (Reference 5).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

There is no floodway shown for the Allegheny River since floodway information was not available.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies have been prepared for the Townships of Brady's Bend and Parker (References 6 and 7). The results of this study are in complete agreement with the results of the Brady's Bend study. The results of this study are not in complete agreement with the results of the Parker study; the information developed for this study reflect more current data and analyses.

A Flood Insurance Study is currently being prepared for the City of Parker City (Reference 8). The results of that study will be in exact agreement with the results of this study.

Due to its more detailed nature, this study supersedes the Flood Hazard Boundary Map for the Township of Perry (Reference 5).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Army Corps of Engineers, Pittsburgh District, Flood Plain Information, Allegheny River, Armstrong County, Pennsylvania, Pittsburgh,Pennsylvania, December 1973.

2. Water Resources Council, "A Uniform Technique for Determining Flood Flow Frequency," Bulletin 15, Washington, D. C., March 1976.

3. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Users Manual, Davis, California, December 1978 with updates.

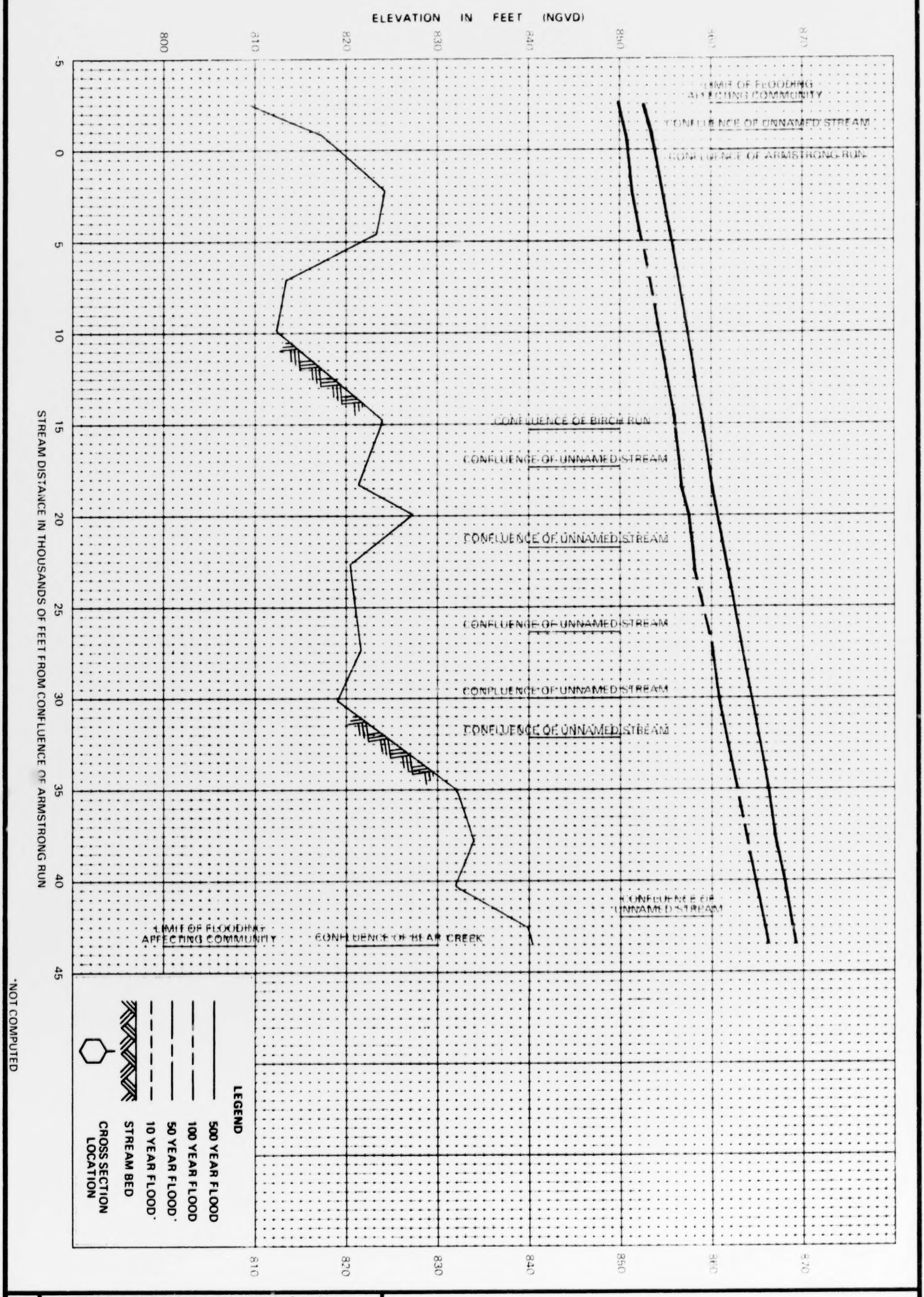
4. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Parker, Pennsylvania, 1968, Photorevised 1979; Rimmersburg, Pennsylvania, 1963, Photorevised 1981.

5. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of Perry, Armstrong County, Pennsylvania, January 10, 1975.

6. Federal Emergency Management Agency, Flood Insurance Study, Township of Brady's Bend, Armstrong County, Pennsylvania, Washington, D. C., July 3, 1986.

7. Federal Emergency Management Agency, Flood Insurance Study, Township of Parker, Butler County, Pennsylvania, Washington, D. C., September 1, 1986.

8. Federal Emergency Management Agency, Flood Insurance Study, City of Parker City, Armstrong County, Pennsylvania (Unpublished).



*NOT COMPUTED

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01P	FEDERAL EMERGENCY MANAGEMENT AGENCY TOWNSHIP OF PERRY, PA (ARMSTRONG CO.)	FLOOD PROFILES ALLEGHENY RIVER